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ABSTRACT

The Vocational Personality Report (VPR) is a computer-generated report that provides information useful in vocational rehabilitation service planning. Input data required by the VPR are 16 raw scores from the Sixteen Personality Factor Questionnaire-Form E (16 PF-E), an inventory designed for persons with low-level language skills. The VPR generates scores on 16 vocationally relevant factors in four distinct conceptual areas: five normal personality scales, two psychopathology scales, three vocational interest scales, and six occupational scales. Written in BASIC for MS DOS machines, the VPR will run on most IBM-compatible computers. The manual includes descriptions of the 16 PF-E primary scales, summaries of VPR developmental studies, instructions for the VPR floppy disk, and 18 references. (JDD)

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Manual for the

Vocational Personality Report

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Manual for the Vocational Personality Report

Brian Bolton

March, 1987

**Arkansas Research and Training Center in Vocational Rehabilitation
University of Arkansas, Fayetteville
Arkansas Rehabilitation Services**

Overview

- *** The Vocational Personality Report (VPR) is a computer-generated report that provides information useful in vocational rehabilitation service planning.
- *** Input data required by the VPR are 16 raw scores from the Sixteen Personality Factor Questionnaire-Form E (16 PF-E), an inventory designed for persons with low-level language skills.
- *** The VPR generates scores on 16 vocationally-relevant factors: five normal personality scales, two psychopathology scales, three vocational interest scales, and six occupational scales.
- *** All 16 scores are represented on the sten (standard ten) scale based on a broadly representative normative sample of almost 1,000 vocational rehabilitation clients.
- *** Written in BASIC for MS DOS machines, the VPR will run on most IBM compatible machines. Copies of the 16 PF-E booklets, answer sheets, scoring keys, and Manual must be purchased from the Institute for Personality and Ability Testing, Champaign, IL.

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This publication was developed under Research and Training Center Grant #G0083C0010 from the National Institute of Handicapped Research, Department of Education, Washington, D.C. 20202. The contents do not necessarily represent the policy of that agency, and one should not assume endorsement by the Federal Government.

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Manual for the Vocational Personality Report

Introduction

The goal of psychometric assessment in vocational rehabilitation counseling is to ascertain information relevant to case planning that will lead ultimately to successful employment for persons with disabilities. Comprehensive assessment in rehabilitation must address all aspects of the client's vocational capabilities, i.e., general abilities, occupational skills, temperamental traits, vocational interests, and work values.

The employability counseling model upon which the Vocational Personality Report (VPR) is based derives from five theoretical formulations of the vocational adjustment process. These are best known by the primary investigators' names: Rene Dawis, William Gellman, David Hershenson, John Holland, and Walter Neff.

Significantly, with the exception of Holland's theory, these operational models of the work adjustment process were developed and refined in vocational rehabilitation settings. Interested readers are referred to Bolton (1982) for capsule summaries of the formulations and to Neff's (1985) volume for more detailed discussions.

The central construct in all five theories is the "work personality" or "vocational personality" of the rehabilitation client. Despite some slight differences in emphasis, all expositions are in essential agreement concerning the characteristic features of the construct. These are as follows:

- The vocational personality is a reflection of the individual's basic trait structure.
- The vocational personality is the product of a lengthy developmental process that begins at a young age.
- The vocational personality is a learned entity shaped by rudimentary work experiences.
- The vocational personality encompasses the concept of self as a worker as well as motivation to work.
- The vocational personality acquires a durable "life of its own", achieving a semi-autonomous status at maturity.

--The vocational personality-work environment correspondence determines the quality of the individual's long-term vocational adjustment.

The VPR was developed to assess selected core aspects of the VR client's vocational personality, viz, normal personality traits, psychopathological tendencies, general vocational interest patterns, and temperamental suitability for major occupational groups. Raw scores from the 16 primary scales of the Sixteen Personality Factor Questionnaire-Form E (16 PF-E) constitute the input data for the VPR.

The 16 PF-Form E

The 16 PF-E is a special purpose personality inventory that was designed for use with persons with limited educational and cultural backgrounds. In particular, it is appropriate for individuals who read as low as the third grade level. Two simplifying features of Form E are: (1) a forced choice format is used rather than allowing an "in between" or "uncertain" response to any item, and (2) all 128 items are phrased as simple questions consisting of two options separated by the conjunction or.

The Sixteen Personality Factor Questionnaire series, which includes five parallel forms, has been demonstrated to measure the major dimensions of the normal personality sphere. Four points are especially noteworthy:

1. The psychometric foundation of the 16 PF spans more than a quarter of a century of research (see Cattell, 1946; 1973).
2. A broad array of evidence supports the factorial validity of Cattell's 16 PF conceptualization of the normal personality sphere (see Bolton, 1978; Cattell & Krug, 1986).
3. A review and synthesis of 19 studies of persons with disabilities that used the 16 PF documented the value of the instrument in understanding response to disablement (see Roessler & Bolton, 1978, pp. 29-40).
4. Factorial studies of 16 PF-E based on a large sample of persons with disabilities have verified its primary and secondary factor structure (see Bolton, 1977; Burdsal & Bolton, 1979).

Details concerning the design, construction, and psychometric characteristics of 16 PF-E are contained in the Manual for 16 PF-E (Institute for Personality and Ability

Testing, 1985). Because the distribution of psychological assessment instruments is restricted to properly qualified persons, 16 PF-E test booklets, answer sheets, and the scoring key can only be purchased through the publisher.

Individuals interested in obtaining 16 PF-E materials should write to the Institute for Personality and Ability Testing, P.O. Box 188, Champaign, IL 61820-0188 or call the IPAT Customer Service Department at (217) 352-4739.

The VPR

The Vocational Personality Report (VPR) is a computer-generated assessment report designed for use in vocational rehabilitation counseling settings. The VPR is scored on 16 employment-relevant scales that are linear transformations of the primary personality dimensions of 16 PF-E. (It should be explained that the generation of 16 VPR scales from 16 personality dimensions is just coincidental.)

Scoring Scales. The 16 VPR scales represent four distinct conceptual areas of vocational personality functioning. The four classes of scales are (1) personality scales, (2) psychopathology scales, (3) general vocational scales, and (4) occupational scales. The last three sets of scales are psychometrically constructed projections of the normal personality sphere into the domains of psychopathology, general vocational interests, and occupational suitability, respectively. This conceptualization is portrayed diagrammatically in Figure 1.

The five personality scales are the well-replicated higher-order dimensions of the normal personality sphere. The VPR scoring equations were taken from Krug and Johns' (1986) research, and adapted to the 16 PF-E rehabilitation client normative sample.

The two psychopathology scales were developed in an investigation of the dimensions of intersection of the domains of normal personality functioning (16 PF) and psychopathological symptomatology for a sample of rehabilitation clients by Bolton and Dana (1987). Summaries of this study and the two investigations cited next are provided in Appendix 3.

The three general interest scales, which are somewhat different for males and females, resulted from a statistical analysis of the dimensional relationships between the normal personality sphere (16 PF) and the domain of vocational interest preferences. Details are reported in journal articles by Bolton (1986) and Brookings and Bolton (1986).

Personality Scales

1. Extraversion
2. Adjustment
3. Tough-mindedness
4. Independence
5. Discipline

Psychopathology Scales

6. Anxiety and Depression
7. Sociopathic Tendency

General Interest Scales

8. Humanitarian-Intelligence
9. Production-Initiative
10. Managerial Leadership

Occupational Scales

11. Realistic Orientation
12. Investigative Orientation
13. Artistic Orientation
14. Social Orientation
15. Enterprising Orientation
16. Conventional Orientation

Figure 1

Scales of the Vocational Personality Report

The six occupational scales were derived from a discriminant analysis of the 16 PF profiles of 69 occupational groups that were allocated to Holland's (1984) 6-category vocational typology. The VPR occupational scales indicate the degree of similarity between the respondent's 16 PF profile and Holland's six occupational categories (Bolton, 1985).

Scores for the first ten scales are calculated via linear equations, while the occupational scores are based on similarity coefficient. Separate formulae were standardized for the male and female norm groups. The interpretations of VPR scales, which are reproduced on each computer-generated report, are given in Table 1.

Report Format. Scale scores on the VPR report are presented graphically and given numerically on the sten (standard ten) scale. As the name signifies, sten scores range from one to ten; the normal sten distribution has a mean value of 5.5 and a standard deviation of 2.0. To provide an indication of the relative frequency of occurrence of standard sten scores in the population, percentile equivalents of the central (integer) sten values are listed next.

<u>Sten Scores</u>									
1	2	3	4	5	6	7	8	9	10
1%	4%	11%	23%	40%	60%	77%	89%	96%	99%
<u>Percentile Equivalents</u>									

The normative sample upon which the VPR scale scores (sten distributions) are based consists of 519 male and 473 female rehabilitation clients. The sample is heterogeneous with respect to demographic characteristics, such as age, marital status, race, and education. The major disabling conditions diagnosed for the normative sample were medical (61%), emotional (27%), and intellectual (11%) disabilities. Details about the normative sample are available in the Manual for 16 PF-E (IPAT, 1985, p. 22).

Reliability and Stability. Table 2 presents estimated reliabilities for ten of the 16 VPR scales, and stability coefficients over a 6-year interval from initial to repeat

Table 1
VPR Scale Interpretations

Personality Scales

1. Extraversion:

High scores describe an outgoing and sociable person who likes to be with other people. This individual prefers to work with others on tasks and projects, rather than working alone.

It should be noted that extraverted people do not necessarily possess good social skills.

2. Adjustment:

High scores describe an emotionally stable person who is satisfied with life. Because this individual is calm, secure, unfrustrated, and resistant to stress, he/she can function well on jobs that involve pressure.

However, high scores may also indicate a lack of motivation for difficult tasks.

3. Tough-mindedness:

High scores describe an individual who follows a rational, objective approach to problems and people. This "facts before feelings" mode of operation is especially suitable for jobs that require bold, decisive, enterprising action.

The danger is that extremely tough-minded people may be insensitive to others and may make impulsive decisions.

4. Independence:

High scores describe a person with the capacity for self-direction who is aggressively individualistic. This person performs well in employment settings that require initiative and self-reliance.

High scoring persons may not respond well to supervision, nor function satisfactorily as team members.

5. Discipline:

High scores describe a careful, cautious, controlled person who has internalized society's rules and abides by them. This individual makes a responsible employee who can function with minimal supervision.

But highly conforming persons may be perceived as rigid and moralistic.

Psychopathology Scales

6. Anxiety and Depression:

High scores indicate a lonely person whose anxiety, low stress tolerance, and inadequate control are manifested in depression, excessive worrying, moodiness, irritability, and poor social relations.

7. Sociopathic Tendency:

High scores indicate an antisocial orientation, with anger and feelings of being misunderstood, accompanied by hostility, aggression, dominance, excitability, suspiciousness, and impulsivity.

General Interest Scales (Males)

8. Humanitarian Commitment:

High scores indicate a general interest in activities that involve interpersonal communication for the purpose of helping people resolve their personal problems.

The associated motivating personality traits are an affective, intuitive, non-intellectual mode of functioning and a concerned, caring attitude toward people.

9. Productive Creativity:

High scores indicate a general interest in activities that involve designing and developing concrete products, while emphasizing creative expression through material transformation.

The associated motivating personality traits are personal independence and aggressive individualism, characterized by energetic self-direction, internal monitoring, and disdain for convention and tradition.

10. Managerial Attitude:

High scores indicate a general interest in activities that involve provision of leadership and direction for other people in the context of scientific, business, and industrial enterprise.

The associated motivating personality traits are strongly dominant social extraversion, stressing friendly support, responsibility, and confidence.

General Interest Scales (Females)

8. Interpersonal Interaction:

High scores indicate a general interest in activities that involve interaction and communication with other people for the purpose of helping them, and strong dislike of agricultural, mechanical, technical, and construction activities.

The associated motivating personality traits are extraversion, emotional sensitivity, and dependency, with predominance of affect, passivity, and reliance on other people.

9. Creative Pursuits:

High scores indicate a general interest in activities that involve creative and aesthetic expression and communication through language, and dislike of routine business office activities.

The associated motivating personality traits are neurotic tendencies and striving for personal independence, with low self-esteem, lack of confidence, and indifferent or abrasive relationships with others.

10. Leadership Preference:

High scores indicate a general interest in activities that involve directing, managing, representing, and being responsible for others in traditional male occupations, i.e., mechanical, technical, construction, and agricultural areas.

The associated motivating personality traits are good emotional adjustment with effective interpersonal skills and an energetic, goal-directed, business-like personal orientation.

Occupational Scales

11. Realistic Orientation:

High scores indicate that the respondent's salient temperamental characteristics are suitable for occupations such as engineer, farmer, mechanic, assembly line worker, custodian, kitchen helper, and meter reader.

Persons in these occupations are typically described as practical, conventional, realistic, conforming, careful, self-reliant, controlled, and socially precise.

12. Investigative Orientation:

High scores indicate that the respondent's salient temperamental characteristics are suitable for occupations such as biologist, scientist, nurse, computer programmer, television repairer, and research assistant.

Persons in these occupations are typically described as independent, mature, rational, reserved, confident, adaptable, self-sufficient, and resourceful.

13. Artistic Orientation:

High scores indicate that the respondent's salient temperamental characteristics are suitable for occupations such as artist, musician, writer, singer, fashion model, interior decorator, and photographer.

Persons in these occupations are typically described as imaginative, sensitive, introspective, nonconforming, assertive, unpretentious, and undisciplined.

14. Social Orientation:

High scores indicate that the respondent's salient temperamental characteristics are suitable for occupations such as teacher, counselor, barber, cosmetologist, ticket agent, bellhop, teacher aide, and homemaker.

Persons in these occupations are typically described as cooperative, friendly, responsible, helpful, warm, group dependent, and a "joiner" and sound follower.

15. Enterprising Orientation:

High scores indicate that the respondent's salient temperamental characteristics are suitable for occupations such as administrator, executive, office manager, salesperson, dispatcher, route driver, hotel clerk, and peddler.

Persons in these occupations are typically described as ambitious, energetic, agreeable, sociable, conscientious, shrewd, controlled, and relaxed.

16. Conventional Orientation:

High scores indicate that the respondent's salient temperamental characteristics are suitable for occupations such as accounting clerk, receptionist, clerical worker, data processing clerk, linotype operator, key punch operator, proofreader, and mail clerk.

Persons in these occupations are typically described as realistic, efficient, conscientious, conforming, practical, accommodating, and self-reliant.

Table 2
VPR Reliability and Stability Coefficients

<u>Personality Scales</u>	<u>Estimated Reliability</u>	<u>Six-Year Stability^a</u>
1. Extraversion	.83	.62***
2. Adjustment	.85	.32
3. Tough-mindedness	.67	.77***
4. Independence	.74	.67***
5. Discipline	.65	.52***
<u>Psychopathology Scales</u>		
6. Anxiety and Depression	.72	.29
7. Sociopathic Tendency	.60	.72***
<u>General Interest Scales (Male)</u>		
8. Humanitarian Commitment	.72	.79***
9. Productive Creativity	.57	.64***
10. Managerial Attitude	.54	.50***
<u>General Interest Scales (Female)</u>		
8. Interpersonal Interaction	.47	.49***
9. Creative Pursuits	.51	.21
10. Leadership Preference	.33	.15
<u>Occupational Scales</u>		
11. Realistic Orientation	--b	.65***
12. Investigative Orientation	--	.39*
13. Artistic Orientation	--	.28
14. Social Orientation	--	.60***
15. Enterprising Orientation	--	.45**
16. Conventional Orientation	--	.46**

^aThe probability levels (2-tailed) for the stability coefficients are: * $p < .05$, ** $p < .01$, *** $p < .001$.

^bReliability coefficients for the Occupational Scales are not calculable by standard methods.

assessments for all 16 scales. The reliability coefficients were computed using a formula derived by Nunnally (1967, p. 231) and parallel form (equivalence) estimates for the 16 PF-E primary scales provided in the Manual for 16 PF-E (IPAT, 1985, p. 8).

It should be stressed that the reliabilities calculated for the VPR scales are most certainly lower-bound estimates, due to the stringent definition of "equivalence" used to generate the 16 PF-E primary scale reliabilities, i.e., composite sten scores from 16 PF Forms C and D were correlated with Form E sten scores. Still, with the exception of the general interest scales, the reliabilities are more than adequate for scales used in vocational counseling applications.

The magnitudes of the 6-year stability coefficients reinforce the qualification stated above concerning the lower-bound nature of the reliability estimates. Calculated for a sample of 32 rehabilitation clients (see Bolton, 1979), the long-term stabilities of many VPR scales are remarkably high, especially considering that they have not been corrected for attenuation (unreliability).

Eight VPR scales have stability coefficients of .60 or higher, while five others are in the range from .45 to .59. This is even more impressive evidence when it is realized that VPR scales measuring trait anxiety, i.e., (2) Adjustment and (7) Anxiety and Depression, and the vocational and occupational scales that are composed in part of 16 PF primary scales that measure various aspects of anxiety, would not be expected to be stable over lengthy periods of time.

Scale Interrelationships. To enable VPR users to better understand the primary scale composition of the VPR scales, Tables 3 and 4 present the correlations of each VPR scale with all 16 PF primary scales. (Scale descriptions for the 16 PF primary scales are provided in Appendix 2.) This information is reflected in the VPR scale interpretations, of course, along with data concerning the pathological, vocational, and occupational correlates of the scales that obtained from the investigations summarized in Appendix 3.

Information pertaining to the intercorrelational structure of the VPR is contained in Tables 5 and 6. The rotated factor patterns are reasonably similar for males and females, with the exception of the general interest scales. The psychometric dimensions isolated in the factor patterns are also evident in the similarities and differences among the VPR scale interpretations.

Table 3

Correlations Between VPR Scales and 16 PF Primary Scales for Males^a

16 PF Primary Scales																
VPR Scales	A	B	C	E	F	G	H	I	L	M	N	O	Q1	Q2	Q3	Q4
1. Extraversion	70				71		75					-37		-84		
2. Adjustment			79				54		-38			-83		-33	50	-83
3. Tough-Minded	-42							-89		-67			-31			
4. Independence				80	30	-49	47		45			-33	49			
5. Discipline				-43		89									77	
6. Anxiety		-64			-38		-42			-33		57		54		87
7. Sociopathic				36	56		67		38							
8. Humanitarian	52						31	92		52						
9. Productive	-35			38	35		36		34	33	-40	-37	44			
10. Managerial	59			30			59					-54		-42		
11. Realistic					-61										69	
12. Investigative	-31		56						-30			-59	40		34	-53
13. Artistic	-38	-33	44			-61				36			43	47	-50	
14. Social	45					-37	46	71		51		-38	31	-37		
15. Enterprising	57	47				45	55		-40			-61		-51	58	-53
16. Conventional				-38	-49	36			-47							

^aDecimals and correlations less than .30 are omitted.

Table 4

Correlations Between VPR Scales and 16 PF Primary Scales for Females^a

		16 PF Primary Scales															
VPR Scales		<u>A</u>	<u>B</u>	<u>C</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>	<u>I</u>	<u>L</u>	<u>M</u>	<u>N</u>	<u>O</u>	Q1	Q2	Q3	Q4
14	1. Extraversion	65		34		72		79					-38		-82		-38
	2. Adjustment			83				52		-39			-78		-44	59	-87
	3. Tough-Minded				45				-73	44	-49						
	4. Independence				76		-55	39		32	51			66			
	5. Discipline			36	-48		89			-32				-34		73	-36
	6. Anxiety	-31		-71		-39		-45		32	-31		56		61	-46	88
	7. Sociopathic				35	55		66		40	33						
	8. Interpersonal	57							58	-32					-43		
	9. Creative		32						31		46		36	38		-52	56
	10. Leadership			33					-31			-37	-38				
	11. Realistic			35		-59										62	
	12. Investigative			53									-59			36	-49
	13. Artistic	-40		-44	54		-67			32	44			45	49	-51	43
	14. Social	31					-40	41	60		51		-37	30	-34		
	15. Enterprising	55		55	-36		49	51		-47			-56		-55	61	-67
	16. Conventional				-39	-50	36	-31		-47							

^aDecimals and correlations less than .30 are omitted.

Table 5
VPR Factor Pattern for Males^a

<u>VPR Scales</u>	<u>Orthogonal Factors^b</u>			
	<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>
1. Extraversion	76	41		
2. Adjustment	77			53
3. Tough-Minded			-96	
4. Independence		73		47
5. Discipline	50	-57		
6. Anxiety	-77			
7. Sociopathic	32	78		
8. Humanitarian			95	
9. Productive		74		49
10. Managerial	69			
11. Realistic		-65		39
12. Investigative				95
13. Artistic	-73	39	34	37
14. Social			85	
15. Enterprising	90	-35		
16. Conventional		-76		

^aDecimals and loadings less than .30 are omitted.

^bVarimax rotation (the first eight eigenvalues are 4.40, 4.20, 2.27, 2.01, 0.99, 0.70, 0.49, and 0.38).

Table 6
VPR Factor Pattern for Females^a

<u>VPR Scales</u>	<u>Orthogonal Factors^b</u>			
	<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>
1. Extraversion	61	67	31	
2. Adjustment	78			54
3. Tough-Minded			-83	
4. Independence	-36	54		59
5. Discipline	70	-39		
6. Anxiety	-77			-32
7. Sociopathic		83		
8. Interpersonal			81	
9. Creative	-72		38	
10. Leadership		31		36
11. Realistic	35	-68		35
12. Investigative				94
13. Artistic	-89			34
14. Social		31	77	49
15. Enterprising	92			
16. Conventional		-74		

^aDecimals and loadings less than .30 are omitted.

^bVarimax rotation (the first eight eigenvalues are 4.87, 3.43, 2.16, 1.82, 1.02, 0.78, 0.61, and 0.52);.

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Appendix 1: Instructions for the VPR Floppy Disk^a

To activate the Vocational Personality Report:

1. Place the DOS diskette for your machine in drive A and turn on the power switches for the display, base unit, and printer.
2. Follow the standard procedures described in your operations manual to reach the A> prompt.
3. Place the VPR diskette in drive B.
4. Type the following command: Copy Command.Com B:
5. Press the ENTER key.
6. Remove your DOS diskette and place the VPR diskette in drive A.
7. Type VPR and press the ENTER key to reach the initial input screen, and follow the instructions on the screen to generate a printed Vocational Personality Report.

^aThe VPR was developed by Brian Bolton and programmed for microcomputer by Paul M. Kuroda.

Appendix 2: Descriptions for the 16 PF Primary Scales

<u>Low Score Description</u>		<u>High Score Description</u>
Reserved, Detached, Critical, Aloof	<u>A Warmth</u>	Outgoing, Warmhearted Easygoing, Participating
Less Intelligent, Concrete Thinking	<u>B Intelligence</u>	More Intelligent, Abstract-Thinking, Bright
Affected by Feel- ings, Emotionally Less Stable, Easily Upset	<u>C Stability</u>	Emotionally Stable, Faces Reality, Calm, Mature
Humble, Mild, Accom- modating, Conforming	<u>E Dominance</u>	Assertive, Aggressive, Stubborn, Competitive
Sober, Prudent, Serious, Taciturn	<u>F Impulsivity</u>	Happy-Go-Lucky, Lively, Gay, Enthusiastic
Expedient, Dis- regards Rules, Feels Few Obliga- tions	<u>G Conformity</u>	Conscientious, Per- severing, Staid, Moralistic
Shy, Restrained, Timid, Threat- Sensitive	<u>H Boldness</u>	Venturesome, Socially Bold, Uninhibited, Spontaneous
Tough-Minded, Self- Reliant, Realistic, No-Nonsense	<u>I Sensitivity</u>	Tender-Minded, Cling- ing, Over-Protected, Sensitive
Trusting, Adapt- able, Free of Jealousy	<u>L Suspiciousness</u>	Suspicious, Self- Opinionated, Hard to Fool
Practical, Careful, Conventional, Regu- lated by External Realities, Proper	<u>M Imagination</u>	Imaginative, Wrapped Up in Inner Urgencies, Careless of Practical Matters
Forthright, Natural, Artless, Unpretent- tious	<u>N Shrewdness</u>	Shrewd, Calculating, Worldly, Penetrating

Self-Assured, Confident, Serene	<u>0 Insecurity</u>	Apprehensive, Self-Reproaching, Worrying, Troubled
Conservative, Respecting Established Ideas	<u>Q1 Radicalism</u>	Experimenting, Liberal, Analytical
Group-Dependent, A "Joiner" and Sound Follower	<u>Q2 Self-Sufficiency</u>	Self-Sufficient, Prefers Own Decisions, Resourceful
Undisciplined Self-Conflict, Follows Own Urges, Careless of Protocol	<u>Q3 Self-Discipline</u>	Controlled, Socially Precise, Following Self-Image
Relaxed, Tranquil, Unfrustrated	<u>Q4 Tension</u>	Tense, Frustrated, Driven, Overwrought

Appendix 3: Summaries of VPR Developmental Studies

1. Multivariate Relationships Between Normal Personality Functioning and Objectively Measured Psychopathology^a

Two major psychological domains have traditionally been the focus of researchers in personality measurement, the realm of normal personality functioning and the domain of psychopathology. These efforts have resulted in numerous standardized instruments, e.g., the California Psychological Inventory, Personality Research Form, Guilford-Zimmerman Temperament Survey, and Sixteen Personality Factors Questionnaire, in the normal area, and the Minnesota Multiphasic Personality Inventory, Clinical Analysis Questionnaire, Psychotic Inpatient Profile, Present State Examination, and Psychiatric Status Schedule, in the pathology area.

Several investigations have examined the relationships between selected self-report instruments in the normal and pathological domains and have repeatedly analysed the common factor variance of the 16 PF and the MMPI. Instruments designed for normal persons have been administered to pathological samples and, conversely, instruments designed to measure psychopathology have been administered to normal samples. Yet, there have been no psychometric investigations of the relationships between normal personality functioning and objectively measured psychopathology, although there are many studies comparing instruments for either domain with psychiatrically diagnosed groups.

The purpose of this study was to explicate the relationships between two factor-analytically derived measures, the Sixteen Personality Factor Questionnaire (16 PF) for normal personality variation, and the Psychiatric Status Schedule (PSS) for objectively measured psychopathology. Specifically, the investigation (a) assessed the variance overlap of the two instruments, and (b) identified the canonical dimensions of intersection.

Method

Subjects

The subjects for this investigation were 181 candidates

^aAbstracted from Bolton, B., & Dana, R. (1987). Journal of Social and Clinical Psychology. Readers are referred to the published article for statistical details, variate interpretations, and references.

for rehabilitation services provided through public agencies in 10 states. The sample was 62% male and 84% white with a median age of 26 years (range from 14 to 61 years). At least 12 years of education were completed by 47% while 78% completed at least 8 years. The major disabilities were as follows: 26% psychoneurosis, psychosis, or personality disorder; 6% alcoholism; 8% intellectual impairment; and 60% with physical/medical disabilities. Because all subjects had been judged to be feasible clients, i.e., there was a reasonable expectation that they would benefit from the provision of rehabilitation services, and none of the subjects were institutionalized or otherwise incapacitated at the time of the investigation, the sample could be characterized as falling within broadly defined normal limits.

Procedure

The Psychiatric Status Schedule (PSS) is a 225-item inventory that is administered in a structured interview format. It is scored on 17 symptom scales and 4 second-order scales. The PSS was individually administered to each subject by a licensed psychologist in conjunction with a comprehensive examination. The 16 PF is a self report personality questionnaire that is scored on 16 primary personality scales and 5 secondary scales. Form E of the 16 PF, which is designed for persons of limited reading ability, was completed during the examination.

The relationships between the 16 primary scales of the 16 PF and the 17 symptom scales of the PSS were assessed using canonical redundancy analysis. Specifically, this analysis examines the overlap or redundancy of the two instruments by locating the successive pairs of canonical variates and calculating their associated variance elements in the corresponding domains, as well as determining the total redundancy of the two domains.

Results

The research sample is distributed in approximately the same way as the normative population on the 16 PF primary scales. In contrast, the PSS distributions are centered below the mean and with considerably restricted variability. Examinations of the frequency distributions of the PSS symptom scales indicated that most subjects scored below 50, with a pronounced skew toward the pathological end of the scales. This form of distribution is expected because the PSS normative population is composed primarily of psychiatric inpatients. These results further support the previous characterization of the research sample as essentially normal. However, the minority of subjects that scored in the

pathological direction provided the variation necessary for valid assessment of redundancy with the normal personality sphere.

Eighteen percent of the total variation in the normal personality sphere is predictable from the PSS profile, while 15% of the psychopathology variance is associated with individual differences on the 16 PF. These results indicate that the overlap between the domains of normal personality and objectively measured psychopathology is relatively small and approximately symmetric in nature. However, these statistics are averages for the entire set of scales in both domains. When the scales are examined for their individual redundancies, it is observed that the overlap of the domains is focused within a subset of the scales.

Because these redundancy figures do not separate "error" variance from that which is statistically significant, and because they are sums of the variance elements across all 16 pairs of canonical variates, it is desirable to partition the scale redundancies in accordance with the pairs of significant canonical variates. Two pairs of canonical variates were statistically significant, $R_{c1}=.70$ ($p < .0001$) and $R_{c2}=.59$ ($p < .03$). The first pair of variates accounted for 8% and 6% of the total variance in the 16 PF and PSS, respectively, while the second pair accounted for an additional 3% and 2% of the total variance. Thus, the first pair accounts for 44% and 40% of the total redundancy of the two domains, while the second pair accounts for 17% and 13% of the total redundancy, respectively.

These two pairs of canonical variates constitute primary dimensions of intersection that describe the pathological extreme of the 16 PF and the relatively normal expressions of PSS scales. The first pair portrays a lonely person whose anxiety, low stress tolerance, and inadequate control are accompanied by depression, alcohol abuse, and impaired social relations. The second pair depicts an antisocial person whose anger and feelings of being misunderstood are accompanied by aggression, dominance, excitability, suspiciousness, and impulsivity.

In summary, the results of this investigation suggest that: (a) the total variance overlap of the domains of normal personality and objectively measured psychopathology is small, (b) two pairs of canonical variates account for the majority of the redundancy, and (c) the dimensions of intersection of normal personality and psychopathology are Anxiety and Depression with associated behavioral and cognitive dysfunction, and Sociopathic Tendency with associated emotional and behavioral manifestations.

2. Canonical Relationships Between Vocational Interests and Personality of Adult Handicapped Persons^a

A major premise in vocational psychology is that vocational interests and occupational choice are expressions or derivatives of a more fundamental construct referred to generically as the individual's personality. The relationships between choice of occupation or actual occupational membership and measured personality characteristics have been documented in numerous investigations. Even better known are the relationships between inventoried vocational interests and occupational membership, i.e., the empirical scales of the Strong-Campbell Interest Inventory (SCII) and the Kuder Occupational Interest Survey (KOIS) are based on the differential responses of satisfactorily employed persons in various occupational groups.

Systematic investigation of the interest-personality relationship provides evidence directly relevant to two issues in vocational psychology. First, if the long-standing hypothesis that occupational behavior is (in part) a function of more basic personality dispositions and traits, then explication of the interconnections between the domains would advance psychological understanding of vocational development. Second, if vocational interests are (in part) a reflection of personality structure, then the puzzling evidence supporting a modest hereditary component in interests could be explained by the already established heritabilities of personality source traits. Another justification for clarifying the personality-interest relationship is that such knowledge would have straightforward applications of personality assessment for occupational exploration and choice.

The purpose of this investigation was to describe the dimensional relationships between the domains of vocational interests and personality for handicapped persons, using canonical correlation analysis of factored scales representing each domain. Specifically, the objective was to identify the composition of the canonical variates that account for the intersection of measured interests and personality traits so that equations for estimating scores on higher-order vocational interest scales could be incorporated into a computer-generated 16 PF report for use by vocational rehabilitation counselors.

^aAbstracted from Bolton, B. (1986). Rehabilitation Psychology, 31, 169-182. Readers are referred to the published article for statistical details, variate interpretations, and references.

Method

Sample

The research sample consisted of 170 males and 182 females who were applicants for vocational rehabilitation (VR) services provided through the state/federal program. The characteristics of the sample, presented separately for males and females, respectively, are: age: median of 28 and 29 years, ranging from 15 to 60; major disability: physical/medical, 74% and 65%, psychiatric, 22% and 33%, intellectual, 4% and 2%; intelligence: median WAIS IQ of 97 and 95, ranging from 80 to 132; education: 8 grades or less, 18% and 14%, 9 to 11 grades, 28% and 31%, 12 grades or more, 54% and 55%; marital status: married, 41% and 27%, divorced, separated, or widowed, 16% and 49%, never married, 43% and 24%; race: white, 85% and 77%.

Instruments

In conjunction with the appraisal process to determine eligibility for VR services, all applicants completed a battery of psychological and vocational instruments, including Form E of the Sixteen Personality Factor Questionnaire (16 PF-E), the California Occupational Preference Survey (COPS), and the Wechsler Adult Intelligence Scale (WAIS). As its title indicates, the 16 PF-E measures 16 primary traits that span the normal personality sphere. Further, Form E was designed for use with persons who read at the third grade level and has norms for vocational rehabilitation clients.

The COPS contains 168 items specifying a wide variety of occupational activities for which examinees indicate their preferences using a standard 4-point response format. An item factor analysis of the COPS for a large sample of VR candidates isolated nine dimensions of vocational interest that were highly similar to factors found in other populations.

Results

On the interest scales males scored significantly ($p < .01$) higher on 1 (Mechanical), 4 (Executive Management), and 8 (Outdoor), while females were significantly ($p < .001$) higher on 2 (Business Detail), 3 (Artistic), 6 (Literary), and 7 (Social Service). On the personality scales, males were significantly ($p < .02$) higher on G (Conformity), whereas females scored significantly ($p < .01$) higher on E (Dominance) and Q₃ (Self-Discipline).

Although the differences between males and females on the

vocational interest scales are consistent with well-documented findings from previous studies, the obtained differences on the 16 PF-E scales are indicative of personality differences between males and females in the research sample, because the respective standard scores (stens) were calculated with reference to separate normative populations of male and female rehabilitation clients.

Recognizing that mean profile differences between males and females may be reflective of differences in interest-personality configural relationships, the matrices of correlations of vocational interest scales with 16 PF-E scales were examined for males and females separately. Of the 144 pairs of correlation coefficients (9 interest scales x 16 personality scales), 14 pairs of absolute differences exceeded .28 in magnitude, a difference that is statistically significant at the .01 level (2-tailed). Because only one or two differences of this size would be expected by chance out of 144 randomly allocated pairs, the decision was made to analyze the interest-personality matrices separately for males and females. Further support for this decision was provided by the results of the significance test for equality of the covariance matrices for males and females ($p < .0001$).

Canonical correlation analysis indicated that 3 pairs of canonical variates were statistically significant at $p < .001$ for both males and females. The canonical correlations for males were: $R_{c1} = .80$ ($p < .0001$); $R_{c2} = .59$ ($p < .0001$); $R_{c3} = .56$ ($p < .001$). The canonical correlations for females were: $R_{c1} = .63$ ($p < .0001$); $R_{c2} = .51$ ($p < .0001$); $R_{c3} = .49$ ($p < .001$). It can be concluded that there do exist statistically significant relationships between vocational interests and normal personality characteristics for male and female clients. Furthermore, the relationships for each sex can be parsimoniously organized into three pairs of independent, psychometrically defined constructs.

The total proportion of variance in vocational interests explainable by the personality scales was .26 (or 26%) for males and .15 (or 15%) for females. The corresponding proportions of personality variance explainable by the interest scales were smaller (16% and 11%, respectively), but these are of less theoretical and practical concern. The 16 PF-E scales of primary importance in determining the nature and direction of vocational interest expression for males were A (Warmth), H (Boldness), I (Sensitivity), M (Imagination), O (Insecurity), Q₁ (Radicalism), and Q₂ (Self-Sufficiency). For females, the most important scales were: A (Warmth), I (Sensitivity), L (Suspiciousness), M (Imagination), Q₂ (Self-Sufficiency), Q₃ (Self-Discipline), and Q₄ (Tension).

Personality characteristics accounted for more variance in the following vocational interests of males: 6 (Literary), 3 (Artistic), 7 (Social Service), 4 (Executive Management), and 1 (Mechanical), in descending order. The most predictable interests of females were: 8 (Outdoor), 6 (Literary), 3 (Artistic), 1 (Mechanical), and 2 (Business Detail), also in descending order. The magnitude of the redundancies, for individual scales as well as total variances, indicates that vocational interests of male clients are more predictable than those of females. However, the ultimate criterion for evaluating the results of canonical correlation analysis is the psychological meaningfulness, and thus the potential utility, of the obtained canonical constructs.

In summary, the three canonical dimensions relating interests and personality for males are: (1) Humanitarian commitment based on an affective, intuitive personal orientation, (2) Productive enterprise motivated by personal initiative and ingenuity, and (3) Leadership capacity expressed through self-confident extraversion. Each of the three canonical dimensions for females represents traditional configurations of vocational interests: (1) Dislike for outdoor, physical occupations and preference for interpersonal activities emphasizing dependence on others, (2) Creative, artistic pursuits with associated neurotic tendencies and interpersonal difficulties, and (3) Leadership in male occupations characterized by good emotional adjustment and effective interpersonal skills.

While these capsule summaries of the canonical dimensions do not fully capture the subtle elements of the underlying constructs, they provide a basis for two specific conclusions about the interrelationships between vocational interests and personality. First, it is apparent that the multivariate linkages are not only psychometrically justified, they are also psychologically meaningful. For each of the six pairs of canonical variates, the combination of interests is clearly a reasonable expression of the unique configuration of associated personality traits. Second, the female interest patterns are qualitatively different from those of males, and the differences are entirely consistent with occupational stereotypes and traditional patterns of female vocational participation.

The broad vocational interest structures represented by the canonical dimensions may be regarded as more fundamental, underlying expressions of vocational interests that emanate, in part, from complex configurations of basic personality characteristics. These results suggest that interests are not a simple function of individual personality traits, implying that the traditional counseling strategy of con-

sidering interest profiles scale-by-scale may distort clients' interests by failing to take into account scale interrelationships. Furthermore, the findings indicate that when considered in their multivariate complexity, vocational interests are meaningfully related to individual differences in clients' temperamental characteristics and interpersonal styles.

3. Discriminant Analysis of Holland's Occupational Types Using the Sixteen Personality Factor Questionnaire^a

John Holland's well-known occupational typology consists of six categories or types, Realistic, Investigative, Artistic, Social, Enterprising, and Conventional, each postulated to have different personality requirements for optimal vocational adjustment. By applying the widely-accepted principle that "choice of an occupation is (in part) an expression of personality," it follows that persons employed in occupations representing Holland's six types of work environments should have highly differentiable personality profiles.

The strongest test of the occupational typology-personality hypothesis is provided by data from persons who are actually employed in the various occupations composing the types. Analysis of personality characteristics of employed persons makes the developmental assumption that individuals typically gravitate to occupational environments that they are best suited for in terms of relevant personality traits.

This article summarizes the results of a multiple discriminant analysis of the 16 PF profiles for 69 occupational groups classified into Holland's six types. Specifically, the investigation was conducted to confirm or disconfirm Holland's descriptions of the six occupational types: Realistic (conforming, hard-headed, practical, inflexible, uninsightful), Investigative (independent, intellectual, precise, rational, reserved), Artistic (emotional, imaginative, introspective, nonconforming, sensitive), Social (cooperative, friendly, helpful, responsible, warm), Enterprising (agreeable, ambitious, energetic, extroverted, sociable), and Conventional (conforming, conscientious, efficient, obedient, practical).

Method

Subjects

The "subjects" in this investigation were 69 occupational groups with mean Sixteen Personality Factor Questionnaire (16 PF) profiles given in the Handbook of the 16 PF. The 16 PF is a widely-used self-report personality questionnaire that

^aAbstracted from Bolton, B. (1985). Journal of Vocational Behavior, 27, 210-217. Readers are referred to the published article for statistical details, variate interpretations, and references.

purports to measure comprehensively the domain of normal personality functioning.

The average score for all 69 occupational groups on each of the 16 PF scales was within plus and minus one-quarter of a standard deviation (SD) of the population mean, with the exception of Intelligence, which was almost one SD above the general population mean. This suggests that the sample of 69 occupational groups is disproportionately represented by professional occupations. The gender distribution of the 69 groups is: male (45), female (18), both (6).

Analysis

The 69 occupational groups were allocated to the six occupational personality types composing Holland's typology using the Dictionary of Holland Occupational Codes. The vast majority of the occupational groups were easily assigned to the appropriate type, but the assignment of eight groups required some judgment.

The number of groups assigned to each of the six types, with median sample size for each occupational group, is as follows: Realistic (10, $n = 55$), Investigative (12, $n = 102$), Artistic (7, $n = 46$), Social (27, $n = 93$), Enterprising (9, $n = 109$), and Conventional (4, $n = 74$). Examples of occupational groups that were unambiguously assigned to the six Holland types are: Realistic (Engineers, Farmers, Janitors), Investigative (Biologists, Physicists, Scientists), Artistic (Artists, Musicians, Writers), Social (Counselors, Priests, Teachers), Enterprising (Administrators, Executives, Salespersons), and Conventional (Accounting Clerks, Clerical Workers).

Multiple discriminant analysis of the six Holland types was carried out using the 16 primary scales of the 16 PF as independent variables. The statistical analysis included an overall MANOVA comparison, calculation of significant discriminant functions, univariate comparisons of the six types (with post-hoc tests) on each of the 16 PF personality scales, classification analysis to assess the magnitude of the personality-occupation relationship, and a graphical plot of the centroids of the six Holland types.

Results and Discussion

The preliminary overall MANOVA comparison of the six Holland types using all 16 personality scales produced a highly significant Wilk's criterion ($F(80, 235) = 3.13, p < .0001$). Two highly significant canonical discriminant functions ($p < .0001$) and one marginally significant function ($p <$

.03) together accounted for 90.5% of the total personality variance among occupational types.

The three discriminant functions can be tentatively labelled Independence, Extraversion, and Anxiety, respectively. While each of the composites contains most of the scales that define well-replicated 16 PF second-stratum factors, the correspondences are not especially good. This is most certainly because the discriminant functions are dimensions of group differences rather than of individual differences, as is the case with the standard 16 PF secondaries. However, the similarities are close enough to warrant the use of 16 PF second-order names.

Twelve of the 16 PF scales significantly differentiated among the six types. Four scales (Warmth, Imagination, Shrewdness, and Self-Sufficiency) discriminated among the six groups at the $p < .0001$ level, three scales (Intelligence, Conformity, and Tension) at the $p < .0005$ level, and four scales (Dominance, Sensitivity, Radicalism, and Self-Discipline) at the $p < .005$ level. Duncan's Multiple Range Test ($p < .05$) was used to identify occupational types that were significantly different from each other on the 16 scales. Personality profiles were constructed for each of the six types using standard 16 PF descriptors associated with the poles of the scales.

Artistic is by far the most different and therefore best-defined occupational type, followed by Investigative, Enterprising, Realistic, Conventional, and Social, in descending order. The Conventional and Social types fall near the mean on almost every 16 PF scale, thus providing few relatively unique descriptive personality characteristics. However, an optimal additive composite of 16 PF scales resulted in the Social occupations being quite different on Extraversion. When the 16 PF profiles for the six occupational types are compared with the brief descriptions from Holland given earlier, it can be seen that the two sets of information are highly consistent.

The predictive accuracy of the first three discriminant functions for the six occupational types was as follows: R (70%), I (75%), A (100%), S (85%), E (44%), and C (50%). The overall proportion of correct predictions is 75.4%, far exceeding the random chance allocation rate. The high levels of statistical significance and the magnitude of the predictive relationships achieved reflect the small error estimate in the current analysis, an error term based on mean profile variability within the six occupational types, rather than intersubject variability within occupational groups and types.

In summary, the results of this study suggest strongly that on the average, occupations when grouped into Holland's typology have distinguishable personality characteristics that correspond to traits enumerated by Holland. Although this analysis supports only one aspect of Holland's theory of vocational choice, the findings should increase vocational counselors' confidence in the validity of Holland's model of vocational environments.

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